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EXAMINER
MOORE, IAN N

ART UNIT	PAPER NUMBER
2661	

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Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	09/687,009	HARPER, JOHN
	Examiner	Art Unit	
	Ian N. Moore	2661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *25 March 2005*.

2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-12,15-17,19-30,32,33 and 35-37* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-12,15-17,19-30,32,33 and 35-37* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1.   Claim rejection, on claims 1,15,19 and 20 under 35 USC § 112 second

paragraph are withdrawn since they are being amended accordingly.

2.   Claims 1-12, 15-17, 19-30, 32, 33 and 35-37 are rejected by the same ground of

rejections.

First set of rejection

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.   Claims 1-4, 8-12,15,16,19,20,22,25,32,33,35 and 37 rejected under 35 U.S.C.

103(a) as being unpatentable over Soloway (U.S. 5,265,092) in view of Elliott (U.S.

6,456,599).

        Regarding Claim 19, Soloway discloses a system (see FIG. 4, a switch 4) for

performing route calculations in a link state routing protocol (see col. 3, line 1-8; the

system utilizes LSP routing protocol) at a node (see FIG. 1, Switch 4) in a computer

network of interconnected nodes (see FIG. 1, Data Packet Switching system; note

that each switch in the data network performs computing/processing; thus it is a

computer network; see col. 3, line 1-20) comprising:

a processor (see FIG. 4, a combined system of Routing Logic 38 and

Forwarding Process Logic 40) operable to evaluate existing routes of the node when

new route information is received (see FIG. 2; col. 3, line 13-24; col. 4, line 1-59;

note that when there is a change in the network, the LSP packet is received at the

switch with newly affected link/route information. The routing logic, according to the

LSP routing protocol, permits each switch to determine/evaluate the current/existing

routes in the forwarding table), and

recalculate routes and modify a routing table (see FIG. 4, Forwarding table

36) for said node only when said new route information improves existing routes or

existing routes are made worse or lost (see col. 3, line 13-24 and col. 4, line 19-65;

note that the LSP packet with the newly affected link/route information is received

due to the network topology changes (i.e. a link is failed, a set of operational

channels on the link changes, or a new switch is deployed). The routing/forwarding

Logic recalculates and modifies/updates the routes in the forwarding table in

accordance with the newly affected links/routes to recover/improve/advance the

current/existing links routing.)

and memory (see FIG. 4, the combined system of LSP Database 34 and

Forwarding Table 36) for storing route information (see col. 9, line 56 to col. 10, line

14), and

upon losing one of the existing routes initializing the process (see col. 4, lines

19-35; when the link is failed, the routing logic is initialized/began).

finding a neighbor node's link information by traversing an LSP (see col. 4,

lines 31-45; notifications are send to/from the adjacent switches by sending link state

packet, LSP, in order to find/discover the adjacent switch's link information; see col.

4, lines 31-35; see col. 6, lines 34-39).

Soloway does not explicitly disclose determining if new route information

improves at least one of the existing routes or at least one of existing routes is made

worse or lost; a best cost; calculating a neighbor cost of reaching a node via the

neighbor node; and setting the best cost to the neighbor cost if the neighbor cost is

less than the best cost. Elliott teaches determining if new route information improves

at least one of the existing routes or at least one of existing routes is made worse or

lost (see FIG. 4, steps S5-S7; the step S6 and S7 determines whether the routing

message which includes the new link from the potential neighbor optimizes/aligns

and improves the existing path/link from the actual neighbor (step S8) or not (Step

S10). Note that "not optimizing/aligning/improving" means, the existing link from the

actual neighbor is made worse; see col. 9, lines 44 to col. 10, lines 2); upon losing

one of the existing routes (see col. 4, lines 25-35); initializing a best cost (see FIG. 3,

S5; FIG. 4, S5, S6; when link state update is receive, the optimal low-cost rout

evaluation begins; see col. 9, lines 20-25; 44-50; see col. 10, lines 9-25; note that

the best for node A to reach Node B is via node C and D);

finding a neighbor node's link information by traversing an LSP (see FIG. 3,

S5, and see FIG. 4, S6; receiving/sending cluster beacons (i.e. link state information

message) to evaluate potential neighbor node's link state information; see col. 9, lines 44-60)

calculating a neighbor cost of reaching a node (see FIG. 2A, Node B) via the neighbor node (see FIG. 2A, Node C and D; see col. 9, lines 54-63; note that node A evaluates a cost of reaching node B via Node C and D); and

setting the best cost (see col. 9, lines 60-64; selecting/setting optimal low-cost) to the neighbor cost (see col. 9, lines 59-63; a low cost of reaching B) if the neighbor cost is less than the best cost (see col. 9, lines 55 to col. 10, lines 8; 16-25; Node A selects/sets node B's cost as an optimal low cost (i.e. new best cost) since node A evaluates that the cost of node B is less expensive than a cost of reaching node B via C and D (i.e. old best cost)).

In view of this, having the system of Soloway and then given the teaching of Elliott, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Soloway, by providing a mechanism to optimally selecting/setting improved/better low-cost actual links/routes, as taught by Elliott. The motivation to combine is to obtain the advantages/benefits taught by Elliott since Elliott states at col. 1, line 40-64, see col. 3, lines 40-46 that such modification would provide optimally selection/setting of low-cost neighbor nodes based upon cost-of transaction.

Regarding Claim 1, a method claim which that substantially all the limitations of the respective system claim 19. Therefore, it is subjected to the same rejection.

Regarding claim 2, Soloway discloses receiving a link state packet (see FIG.

5, LSP packet) with information about the node's path to a root node (see FIG. 5,

Originator ID, Sender, Adjacency information, in the LSP packet; see col. 10, line 57

to col. 11, line 50; note that a root node is the originator of LSP packet.) and wherein

the node's route to the root node is improved (see col. 3, line 13-24 and col. 4, line

19-65; note that the LSP packet with the newly affected link/route information is ·

received due to the network topology changes (i.e. adding a new node/switch in the

network). The routing/forwarding Logic recalculates/updates the routes in the

forwarding table in accordance with the newly affected links/routes to

improve/advance the current/existing links routing.

Elliott teaches wherein the node's route to the root node is improved and

further comprising evaluating the node's neighbor nodes (see FIG. 5 and FIG. 9,

Steps S31-S42; see col. 9, line 26 to col. 11, line 20; note that a node receives

cluster beacons (i.e. link-state updates) message from the neighbors. The node

determines/evaluates whether the sender node in the beacon message is already in

the routing table. If the sender node is already the actual neighbor, the node stores

the sender node ID into actual neighbor table (i.e. the table that stores existing

routes/nodes). However, if the sender node ID in the message is not currently in the

routing table (i.e. the sender node is newly added route/node), then the newly added

sender node ID is added to the potential neighbor table (i.e. the table that stores

newly added route/node). Then after, the actual routes and potential/new routes are

compared, and the potential/new routes are added to the actual neighbor table if

new/potential routes are better/improved routes than actual/current/existing routes).

In view of this, having the system of Soloway and then given the teaching of

Elliott, it would have been obvious to one having ordinary skill in the art at the time

the invention was made to modify the system of Soloway, by providing a mechanism

to optimally select improved/better actual links/routes from potential/new

links/routes, as taught by Elliott. The motivation to combine is to obtain the

advantages/benefits taught by Elliott since Elliott states at col. 1, line 40-64, see col.

3, lines 40-46 that such modification would provide optimally selection/setting of low-

cost neighbor nodes based upon cost-of transaction.

Regarding Claim 3, Soloway discloses receiving a link state packet (see

FIG. 5, LSP packet) with information about the node's path to a root node (see FIG.

5, Originator ID, Sender, Adjacency information, in the LSP packet; see col. 10, line

57 to col. 11, line 50; note that a root node is the originator of LSP packet.) and

wherein the node's route to the root node has worsened (see col. 3, line 13-24 and

col. 4, line 19-65; note that the LSP packet with the newly affected link/route

information is received due to the network topology changes (i.e. a link is failed, or a

set of un-operational channels on the link) and further comprising evaluating the

node's path to the root node (see FIG. 2, List of forwarding channels, hold down bit

channel 8a; see col. 8, line 12-60; note that the switch determines/evaluates the

forwarding table by changing each potential destination node entry (i.e. hold down

bit on that particular channel of the affected links/routes). Also, note that the

destination node entries in the forwarding table include the neighbors'

switches/nodes.)

Regarding claim 4, Soloway discloses wherein nodes contained within a

subtree containing the node (see FIG. 2, the intermediate switches 4 between end

nodes 10; note that the forwarding table in each node/switch contains the

intermediate/subtree switches (i.e. neighbor switches)) are scrapped, and the routes

to all nodes in the subtree are reevaluated (see FIG. 2, List of forwarding channels,

hold down bit channel 8a; see col. 8, line 12-60; note that the switch determines/re-

evaluates the forwarding table by changing each destination node entry (i.e. hold

down bit on that particular channel of the affected links/routes) after receiving a link

change LSP due to a failure.) Moreover, in case of a link failure, the routes/links to

the source/root node, stored in the forwarding table, are no longer operational; the

routing/forwarding logic must re-evaluate and re-compute the existing routes in

accordance with the affected links/routes. In the process of recovering/improving the

routing, first the logic must cancel the links/routes associated with the affected

switches. Then after, the routing logic must re-evaluate and re-compute all

routes/links associated with the immediate switches/nodes in the forwarding table.

Regarding Claim 8, Soloway discloses wherein the computer network

comprises greater than one hundred nodes (see FIG. 1, switches 4, and see col. 23,

line 50-52; note that the network includes plurality of switches; thus, it is clear that

the plurality of switches can be greater than one hundred nodes).

Regarding Claim 9, Soloway discloses wherein said node has lost its path to

another node within the computer network (see col. 4, line 25-30 and 60-65; note

that the channel failure or a permanent link failure constitutes the losing the link to

another switch.)

Regarding Claim 10, Soloway discloses reattaching the node at a location

within a remaining portion of a spanning tree (see FIG. 2, a routing table of switch 4a

consists the Hold-down bit for channel 8a of switch 4d; FIG. 9 step 74-78; col. 3, line

15-41; col. 8, line 12-61; col. 6, line 34-69; note that when LSP/ILSP indicates the

affected link, the switch 4a enters the switch (i.e. switch 4d) associated with the

affected links (i.e. hold-down bit entry) in the forwarding table/tree. Then, the switch

(i.e. Switch 4a) re-computes/re-calculates/reattaches the switches associated with

the remaining non-affected links/switches in the forwarding table. Note that a

spanning tree is the forwarding table, which is build according to Dijkstra's

algorithm.)

Regarding Claim 11, Soloway discloses recalculating routes to all other

nodes in a subtree of which the node is a root node (see FIG. 2; col. 6, line 34-69;

note that when LSP/ILSP indicates the affected link, the switch (i.e. Switch 4a) re-

computes/re-calculates the links/routes associated with the switches/end-nodes the

in the forwarding table. One of the switches (i.e. Switch 4d) is the origination node.)

Regarding Claim 12, Soloway discloses performing an incremental route

recalculation for all nodes within the network that have received new link state

information (see col. 3, line 13-24 and col. 4, line 19-65; note that routing/forwarding

Logic recalculates/updates the routes in the forwarding table upon receiving LSP

packet. Also, see col. 7, line 60 to col. 8, line 33; and col. 20, line 31-61; note that

routing and forwarding logics in each switch utilizes Dijkstra's algorithm shortest path

calculation to compute/construct each route/link for the forwarding table. When

applying Dijkstra's algorithm for shortest paths, the algorithm must utilize the

differences/increments/deltas between existing routes and newly affected routes.

Thus, each switches utilizes incremental route calculation.)

Regarding Claim 15, a computer program product claim which that

substantially all the limitations of the respective system claim 19. Therefore, it is

subjected to the same rejection.

Regarding Claim 16, Soloway discloses wherein the computer readable

medium is selected from the group consisting of CD-ROM, floppy disk, flash

memory, system memory, hard drive, and data signal embodied in a carrier wave

(see FIG. 4, the combined system of LSP Database 34 and Forwarding Table 36;

see col. 9, line 56 to col. 10, line 14; note that the combined system is the "system

memory" since it is capable of storing route information.)

Regarding Claim 20, a system claim which that substantially all the

limitations of the respective system claim 19. Therefore, it is subjected to the same

rejection.

Regarding Claim 22, Soloway discloses a method for performing route

calculations in a link state routing protocol (see col. 3, line 1-8; the system utilizes

LSP routing protocol) at a root node (see FIG. 5, Originator ID, Sender, Adjacency

information, in the LSP packet; see col. 10, line 57 to col. 11, line 50; note that a root

node is the originator of LSP packet) within a computer network, the method

comprising:

receiving new route information at the root node (see FIG. 2; col. 3, line 13-

24; col. 4, line 1-59; note that when there is a change in the network, the LSP packet

is received at the switch with newly affected link/route information);

evaluating changes in state and evaluating routes (see FIG. 4, a combined

system of Routing Logic 38 and Forwarding Process Logic 40; col. 3, line 13-24; col.

4, line 1-59; The combined logic, according to the LSP routing protocol, permits each

switch to determine/evaluate the changing states in current/existing routes in the

forwarding table),

reattaching routes in a spanning tree (see FIG. 2, a routing table of switch 4a

consists the Hold-down bit for channel 8a of switch 4d; FIG. 9 step 74-78; col. 3, line

15-41; col. 8, line 12-61; col. 6, line 34-69; note that when LSP/ILSP indicates the

affected link, the switch 4a enters the switch (i.e. switch 4d) associated with the

affected links (i.e. hold-down bit entry) in the forwarding table/tree. Then, the switch

(i.e. Switch 4a) re-computes/re-calculates/reattaches the switches associated with

the remaining non-affected links/switches in the forwarding table. Note that a

spanning tree is the forwarding table, which is build according to Dijkstra's

algorithm.) and re-evaluating routes from reattached nodes (see FIG. 2, List of

forwarding channels, hold down bit channel 8a; see col. 8, line 12-60; note that the

switch determines/re-evaluates the forwarding table by changing each destination

node entry (i.e. hold down bit on that particular channel of the affected links/routes) after receiving a link change LSP due to a failure.) Moreover, in case of a link failure, the routes/links to the source/root node, stored in the forwarding table, are no longer operational; the routing/forwarding logic must re-evaluate and re-compute the existing routes in accordance with the affected links/routes. In the process of recovering/improving the routing, first the logic must cancel the links/routes associated with the affected switches. Then after, the routing logic must re-evaluate and re-compute all routes/links associated with the immediate switches/nodes in the forwarding table); and

upon losing one of the existing routes initializing the process (see col. 4, lines 19-35; when the link is failed, the routing logic is initialized/began).

finding a neighbor node's link information by traversing an LSP (see col. 4, lines 31-45; notifications are send to/from the adjacent switches by sending link state packet, LSP, in order to find/discover the adjacent switch's link information; see col. 4, lines 31-35; see col. 6, lines 34-39).

Soloway does not explicitly disclose sorting nodes with new route information into order of cost; evaluating if existing routes are improved, lost or made worse; reattaching routes at lowest cost point; a best cost; calculating a neighbor cost of reaching a node via the neighbor node; and setting the best cost to the neighbor cost if the neighbor cost is less than the best cost. However, Elliott teaches sorting nodes (see FIG. 4, step S6, perform optimization evaluation) with new route information into order of cost (see col. 9, lines 44-50; the actual and neighbor nodes

are optimized/sorted in accordance with the new route message and lowest-cost for

routing messages. Thus, the nodes are optimized/sorted into order of cost);

evaluating routes if existing routes are improved, lost or made worse (see

FIG. 4, steps S5-S7; the step S6 and S7 determines whether the routing message

which includes the new link from the potential neighbor optimizes/aligns and

improves the existing path/link from the actual neighbor (step S8) or not (Step S10).

Note that "not optimizing/aligning/improving" means, the existing link from the actual

neighbor is made worse; see col. 9, lines 44 to col. 10, lines 2;

reattaching routes at lowest cost point (see col. 9, lines 44-67; the link/path

from the node with the less expensive or lowest-cost is selected and incorporated

into network topology in the routing table); initializing a best cost (see FIG. 3, S5;

FIG. 4, S5, S6; when link state update is receive, the optimal low-cost rout

evaluation begins; see col. 9, lines 20-25; 44-50; see col. 10, lines 9-25; note that

the best for node A to reach Node B is via node C and D);

finding a neighbor node's link information by traversing an LSP (see FIG. 3,

S5, and see FIG. 4, S6; receiving/sending cluster beacons (i.e. link state information

message) to evaluate potential neighbor node's link state information; see col. 9,

lines 44-60)

calculating a neighbor cost of reaching a node (see FIG. 2A, Node B) via the

neighbor node (see FIG. 2A, Node C and D; see col. 9, lines 54-63; note that node A

evaluates a cost of reaching node B via Node C and D); and

setting the best cost (see col. 9, lines 60-64; selecting/setting optimal low-cost) to the neighbor cost (see col. 9, lines 59-63; a low cost of reaching B) if the neighbor cost is less than the best cost (see col. 9, lines 55 to col. 10, lines 8; 16-25; Node A selects/sets node B's cost as an optimal low cost (i.e. new best cost) since node A evaluates that the cost of node B is less expensive than a cost of reaching node B via C and D (i.e. old best cost)).

In view of this, having the system of Soloway and then given the teaching of Elliott, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Soloway, by providing a mechanism to optimally selecting/setting improved/better low-cost actual links/routes and sorts/selects/reattaches routes according to the lowest-cost, as taught by Elliott. The motivation to combine is to obtain the advantages/benefits taught by Elliott since Elliott states at col. 1, line 40-64, see col. 3, lines 40-46 that such modification would provide optimally selection/setting of low-cost neighbor nodes based upon cost-of transaction.

Regarding Claim 25, Soloway discloses a root node, and Elliott discloses teaches sorting nodes into the order of nodes and the root node as described above in claim 22. Thus, the combined system sorts nodes in to order of cost from the root node. In view of this, having the system of Soloway and then given the teaching of Elliott, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the system of Soloway, as taught by Elliott, for the same reason as stated above in claim 22.

Regarding Claim 27, a claim which that substantially all the limitations of the respective claim 4. Therefore, it is subjected to the same rejection.

Regarding Claim 30, Soloway discloses applying an incremental Dijkstra's algorithm to the root node (see col. 7, line 60 to col. 8, line 33; and see col. 20, line 31-61; note that routing and forwarding logics in each switch utilizes Dijkstra's algorithm shortest path calculation to compute/construct each route/link for the forwarding table. When applying Dijkstra's algorithm for shortest paths, the algorithm must utilize the differences/increments/deltas between existing routes and newly affected routes.)

Regarding Claim 32, Soloway discloses wherein said at least one the existing routes is made worse (see col. 3, line 13-24 and col. 4, line 19-65; note that the LSP packet with the newly affected link/route information is received due to the network topology changes (i.e. a link is failed, or a set of un-operational channels on the link) and further comprising recalculating routes to all nodes in a subtree of the node (see FIG. 2, List of forwarding channels, hold down bit channel·8a; see col. 8, line 12-60; note that the switch determines/re-evaluates the forwarding table by changing each destination node entry (i.e. hold down bit on that particular channel of the affected links/routes) after receiving a link change LSP due to a failure.) Moreover, in case of a link failure, the routes/links to the source/root node, stored in the forwarding table, are no longer operational; the routing/forwarding logic must re-evaluate and re-compute the existing routes in accordance with the affected links/routes. In the process of recovering/improving the routing, first the logic must

cancel the links/routes associated with the affected switches. Then after, the routing

logic must re-evaluate and re-compute all routes/links associated with the immediate

switches/nodes in the forwarding table.)

Regarding Claim 33, the combined system of Soloway and Elliott discloses

wherein recalculating routes to all nodes which have received new link state

information and processing said nodes in the order of distance from a root node (see

Soloway col. 7, line 60 to col. 8, line 33; and see col. 20, line 31-61; note that routing

and forwarding logics in each switch utilizes Dijkstra's algorithm shortest path

calculation to compute/construct each route/link for the forwarding table. When

applying Dijkstra's algorithm for shortest paths, the algorithm must utilize the

differences/increments/deltas between existing routes and newly affected routes.)

Elliott discloses processing in increasing order of distance from a root node (see col.

5, lines 34-55; see col. 20-65; see col. 10, lines 35-65; note that the received route

messages are processed starting from the lowest cost (i.e. shortest distance or path)

from the source/root node. Also, when determining the shortest path starting from

the lowest cost or shortest path, one must process in increasing order since the

lowest cost or shortest path has already been defined.) In view of this, having the

system of Soloway and then given the teaching of Elliott, it would have been obvious

to one having ordinary skill in the art at the time the invention was made to modify

the system of Soloway, as taught by Elliott, for the same reason as stated above in

claim 1.

Regarding Claim 35, the combined system of Soloway and Elliot discloses determining if said new route information improves or worsen at least one of the existing routes or at least one of the existing route is lost as described above in claim 1. Soloway discloses applying an incremental Dijkstra's algorithm to the root node (see col. 7, line 60 to col. 8, line 33; and see col. 20, line 31-61; note that routing and forwarding logics in each switch utilizes Dijkstra's algorithm shortest path calculation to compute/construct each route/link for the forwarding table. When applying Dijkstra's algorithm for shortest paths, the algorithm must utilize the differences/increments/deltas between existing routes and newly affected routes.

Regarding Claim 37, Soloway discloses wherein the number nodes examined (see FIG. 2, number of switches (and their corresponding path) which associated/involved with re-routing or updating the table) is proportional to the log of the number of nodes within the network (see FIG. 2, proportional to the number of switches in the forwarding table/log/list of switches in the network; see col. 8, lines 10-60). Elliot also discloses wherein number nodes examined (see FIG. 4, step 6; number of node (and their corresponding route) in the evaluation process) is proportional to the log of the number of nodes within the network (see FIG. 2A-C, note that the nodes involve in evaluating process are proportional to the list/log of number of nodes in the network; see col. 4, lines 15-65; col. 9, lines 44 to col. 10, lines 2; see col. 9, lines 20-25; 44-50; see col. 10, lines 9-25).

5.   Claims 5-7, 17, 21, 23, 26, 28 and 36 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Soloway in view of Elliott, as described in above claims, and

further in view of Callon (U.S. 5,430,727).

Regarding claim 5, Soloway discloses all aspects of the claimed invention

set forth in the rejection of Claim 1, and further discloses wherein recalculating

existing routes comprises implementing equal-cost path (see col. 7, line 60 to col. 8,

line 33; and see col. 20, line 31-61; note that routing and forwarding logics in each

switch utilizes Dijkstra's algorithm shortest path calculation when computing/re-

computing or constructing/re-construing routes/links for the forwarding table. It is

also note that when two shortest paths have the same cost, the rout/link is selected

based upon the order of the channel address (i.e. tie-breaker).) The tiebreaker rule

is implemented for two equal-cost paths in Soloway teachings. Elliott teaches

determining cost of each route as described above in claims 1 and 22. Neither

Soloway nor Elliott explicitly discloses equal-cost path splitting or splitting traffic

across more than one path if total cost is the same for each of the paths. However,

the above-mentioned claimed limitations are taught by well-established teaching in

the art of routing and Dijkstra algorithm, which teaches equal-cost path splitting or

splitting traffic across more than one path if total cost is the same for each of the

paths. In particular, Callon teaches implementing equal-cost path splitting or splitting

traffic across more than one path if total cost is the same for each of the paths (see

col. 46, lines 50 to col. 47, lines 60; see col. 51, lines 44 to col. 45, lines 22; Dijkstra

calculation and forwarding and feature of 10589). Therefore, it would have been

obvious to one having ordinary skill in the art at the time the invention was made to

assign/implement Dijkstra algorithm's equal-cost path splitting, as taught by Callon in

the combined system of Soloway and Elliott, so that it would balance the load in the

network; see Callon col. 46, line 55-57; note that by splitting the load over equal cost

paths, it would decrease overloading one particular route/link by implementing and

assigning equal cost to path/routes and by distributing/splitting the traffic load among

equal cost links.

Regarding claim 6, Soloway discloses wherein the new route information

improves existing routes and the new route information is used in recalculating

routes (see col. 3, line 13-24 and col. 4, line 19-65; note that the LSP packet with the

newly affected link/route information is received due to the network topology

changes (i.e. adding a new node/switch in the network). The routing/forwarding

Logic recalculates/updates the routes in the forwarding table in accordance with the

newly affected links/routes to improve/advance the current/existing links routing.)

Soloway does not explicitly disclose only a parent node sending the new

route information is used in recalculating of improved routes. However, Elliott

teaches only a parent node (see FIG. 2A, neighbor node A) sending the new route

information is used in recalculating of improved routes (see col. 9, line 26 to col. 11,

line 20; note that node E receives the cluster beacons (i.e. link-state updates)

message from the neighbors A, B, C, and D. According to the beacon messages,

node E detects that the data/packet in path node E-D-B is encountering large

amount of congestions, and determines that the lesser cost and improve route from

node E to node B is by incorporating neighbor node A into the route recalculation.) In

view of this, having the system of Soloway and then given the teaching of Elliott, it

would have been obvious to one having ordinary skill in the art at the time the

invention was made to modify the system of Soloway, by providing a mechanism to

incorporate the neighbor node into an improved route re-calculation upon receiving a

beacon message, as taught by Elliott. The motivation to combine is to obtain the

advantages/benefits taught by Elliott since Elliott states at col. 1, line 40-64, see col.

3, lines 40-46 that such modification would provide optimally selection/setting of low-

cost neighbor nodes based upon cost-of transaction.

Regarding claims 7 and 26, Soloway discloses all aspects of the claimed

invention set forth in the rejection of Claims 1, and further discloses wherein the new

route information worsens existing routes and a parent node sending the information

is no longer considered a parent node by said node (see FIG. 2, List of forwarding

channels, hold down bit channel 8a; see col. 8, line 12-60; note that the switch

determines/re-evaluates the forwarding table by changing and excluding each

destination node entry associated with the affected links/routes (i.e. hold down bit on

that particular channel of the affected links/routes) after receiving a link change LSP

due to a failure. Also, the patent node, a sender node, (i.e. FIG. 1, Switch 4c)

sending the LSP packet due to a failure is excluded from the destination node entry

in the forwarding table by hold down bits.

Regarding Claim 17, claim which that substantially discloses all the

limitations of the respective claim 5. Therefore, it is subjected to the same rejection.

Regarding Claim 21, claim which that substantially discloses all the

limitations of the respective claim 5. Therefore, it is subjected to the same rejection.

Regarding Claim 23, claim which that substantially discloses all the

limitations of the respective claim 5. Therefore, it is subjected to the same rejection.

Regarding Claim 24, Soloway discloses performing an incremental route

recalculation (see col. 3, line 13-24 and col. 4, line 19-65; note that

routing/forwarding Logic recalculates/updates the routes in the forwarding table upon

receiving LSP packet. Also, see col. 7, line 60 to col. 8, line 33; and col. 20, line 31-

61; note that routing and forwarding logics in each switch utilizes Dijkstra's algorithm

shortest path calculation to compute/construct each route/link for the forwarding

table. When applying Dijkstra's algorithm for shortest paths, the algorithm must

utilize the differences/increments/deltas between existing routes and newly affected

routes. Thus, each switches utilizes incremental route calculation.)

Regarding Claim 28, claim which that substantially discloses all the

limitations of the respective claim 5. Therefore, it is subjected to the same rejection.

Regarding Claim 36, claim which that substantially discloses all the

limitations of the respective claim 5. Therefore, it is subjected to the same rejection.

6.   Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Soloway

in view of Elliott, as applied to claim 1 above, and further in view of Spiegel (U.S.

5,649,108).

Regarding claim 29, the combined system of Soloway and Elliott discloses

all aspects of the claimed invention set forth in the rejection of Claim 1 as described

above. Soloway further teaches each node within the computer network is

represented by a data structure (see FIG. 4, a combined system of LSP database 34

and forwarding table 36; see col. see col. 9, lines 56 to col. 10, lines 12) comprising

information about links to other nodes (see FIG. 2, list of forwarding channels for the

destination switch 4b-d and end nodes; see col. 8, lines 8, lines 45 to col. 9, lines 49)

and cost of the link (see col. 14, lines 56 to col. 15, lines 24);

Neither Soloway nor Elliott explicitly discloses cumulative cost of all links

traversed from root to the node. However, Spiegel'108 teaches wherein each node

(see FIG. 6A, Node A) is represented by a data structure (see FIG. 6A, Routing

Table) comprising the information about the links to other nodes (see FIG. 6A,

Source route column) and cumulative cost of all links traversed from root (see FIG.

6A, destination address column) to the node (see FIG. 6A, total accumulative cost

for each destination; see col. 10, line 11-50). In view of this, having the combined

system of Soloway and Elliott, then given the teaching of Spiegel'108, it would have

been obvious to one having ordinary skill in the art at the time the invention was

made to modify the combined system of Soloway and Elliott, by providing the

cumulative cost in the routing table, as taught by Spiegel'108. The motivation to

combine is to obtain the advantages/benefits taught by Spiegel'108 since

Spiegel'108 states at col. 2, line 24-35 that such modification would provide the best

alternative paths by utilizing routing control which combine the benefits of

progressive protocol and originating routing protocol.

Second set of rejection

7.   Claims 1-4, 8-12,15,16,19,20,22,25,32, 33, 35 and 37 rejected under 35 U.S.C.

103(a) as being unpatentable over Soloway (U.S. 5,265,092) in view of Corslin (U.S.

5,838,660).

Regarding Claim 19, Soloway discloses a system (see FIG. 4, a switch 4) for

performing route calculations in a link state routing protocol (see col. 3, line 1-8; the

system utilizes LSP routing protocol) at a node (see FIG. 1, Switch 4) in a computer

network of interconnected nodes (see FIG. 1, Data Packet Switching system; note

that each switch in the data network performs computing/processing; thus it is a

computer network; see col. 3, line 1-20) comprising:

a processor (see FIG. 4, a combined system of Routing Logic 38 and

Forwarding Process Logic 40) operable to evaluate existing routes of the node when

new route information is received (see FIG. 2; col. 3, line 13-24; col. 4, line 1-59;

note that when there is a change in the network, the LSP packet is received at the

switch with newly affected link/route information. The routing logic, according to the

LSP routing protocol, permits each switch to determine/evaluate the current/existing

routes in the forwarding table), and

recalculate routes and modify a routing table (see FIG. 4, Forwarding table

36) for said node only when said new route information improves existing routes or

existing routes are made worse or lost (see col. 3, line 13-24 and col. 4, line 19-65;

note that the LSP packet with the newly affected link/route information is received

due to the network topology changes (i.e. a link is failed, a set of operational

channels on the link changes, or a new switch is deployed). The routing/forwarding

Logic recalculates and modifies/updates the routes in the forwarding table in

accordance with the newly affected links/routes to recover/improve/advance the

current/existing links routing.)

and memory (see FIG. 4, the combined system of LSP Database 34 and

Forwarding Table 36) for storing route information (see col. 9, line 56 to col. 10, line

14), and

upon losing one of the existing routes initializing the process (see col. 4, lines

19-35; when the link is failed, the routing logic is initialized/began).

finding a neighbor node's link information by traversing an LSP (see col. 4,

lines 31-45; notifications are send to/from the adjacent switches by sending link state

packet, LSP, in order to find/discover the adjacent switch's link information; see col.

4, lines 31-35; see col. 6, lines 34-39).

Soloway does not explicitly disclose determining if new route information

improves at least one of the existing routes or at least one of existing routes is made

worse or lost; a best cost; calculating a neighbor cost of reaching a node via the

neighbor node; and setting the best cost to the neighbor cost if the neighbor cost is

less than the best cost. Croslin teaches determining if new route information (see

FIG. 6a, accumulate cost of the next node) improves at least one of the existing

routes (see FIG. 6a, 612, cost threshold) or at least one of existing routes is made

worse or lost (see FIG. 6a, Step 606, 610, 612 and 616; see col. 6, lines 55-65; see

col. 10, lines 50-67); upon losing one of the existing routes (see FIG. 2, a link failure

between A 202 and B 204; see col. 5, lines 25-36); initializing a best cost (see FIG.

6a, step 602, a method for calculating best cost rout begins; see col. 10, lines 40-

45);

finding a neighbor node's link information by traversing a message (see FIG.

4, step 404 and 408; Find best route from a next node by sending a message; see

col. 10, lines 1-6; 49-50;see col. 2, lines 9-30);

calculating a neighbor cost of reaching a node (see FIG. 6a, step 610,

accumulate cost) via the neighbor node (see FIG. 2, next node (i.e. Node D); see

col. 10, lines 51-54; accumulated cost to destination node (i.e. node C) via next

node); and

setting the best cost (see FIG. 6a, 612,616 and see FIG. 6b, 618, 626, 628;

new best cost and optimal cost route) to the neighbor cost (see FIG. 6a,

accumulated cost) if the neighbor cost is less than the best cost (see FIG. 6a, 616;

accumulated cost is less than current best cost; see col. 10, lines 50-67; see col. 11,

lines 9-15)). Therefore, it would have been obvious to one having ordinary skill in the

art at the time the invention was made to calculating and selecting/setting the best

and optimal route, as taught by Croslin in the system of Soloway, so that it would

provide a mechanism for dynamically generation routes within a diverse

interconnected network and making the route costing an integral part of the process;

see Croslin col. 2, line 50-65.

Regarding Claim 1,15, and 20, claims 1,15, 20 are a method, a computer

program product and system claims which that substantially all the limitations of the

respective system claim 19. Therefore, they are subjected to the same rejections.

Regarding Claim 22, Soloway discloses a method for performing route

calculations in a link state routing protocol (see col. 3, line 1-8; the system utilizes

LSP routing protocol) at a root node (see FIG. 5, Originator ID, Sender, Adjacency

information, in the LSP packet; see col. 10, line 57 to col. 11, line 50; note that a root

node is the originator of LSP packet) within a computer network, the method

comprising:

receiving new route information at the root node (see FIG. 2; col. 3, line 13-

24; col. 4, line 1-59; note that when there is a change in the network, the LSP packet

is received at the switch with newly affected link/route information);

evaluating changes in state and evaluating routes (see FIG. 4, a combined

system of Routing Logic 38 and Forwarding Process Logic 40; col. 3, line 13-24; col.

4, line 1-59; The combined logic, according to the LSP routing protocol, permits each

switch to determine/evaluate the changing states in current/existing routes in the

forwarding table),

reattaching routes in a spanning tree (see FIG. 2, a routing table of switch 4a

consists the Hold-down bit for channel 8a of switch 4d; FIG. 9 step 74-78; col. 3, line

15-41; col. 8, line 12-61; col. 6, line 34-69; note that when LSP/ILSP indicates the

affected link, the switch 4a enters the switch (i.e. switch 4d) associated with the

affected links (i.e. hold-down bit entry) in the forwarding table/tree. Then, the switch

(i.e. Switch 4a) re-computes/re-calculates/reattaches the switches associated with

the remaining non-affected links/switches in the forwarding table. Note that a

spanning tree is the forwarding table, which is build according to Dijkstra's

algorithm.) and re-evaluating routes from reattached nodes (see FIG. 2, List of

forwarding channels, hold down bit channel 8a; see col. 8, line 12-60; note that the

switch determines/re-evaluates the forwarding table by changing each destination

node entry (i.e. hold down bit on that particular channel of the affected links/routes)

after receiving a link change LSP due to a failure.) Moreover, in case of a link failure,

the routes/links to the source/root node, stored in the forwarding table, are no longer

operational; the routing/forwarding logic must re-evaluate and re-compute the

existing routes in accordance with the affected links/routes. In the process of

recovering/improving the routing, first the logic must cancel the links/routes

associated with the affected switches. Then after, the routing logic must re-evaluate

and re-compute all routes/links associated with the immediate switches/nodes in the

forwarding table); and

upon losing one of the existing routes initializing the process (see col. 4, lines

19-35; when the link is failed, the routing logic is initialized/began).

finding a neighbor node's link information by traversing an LSP (see col. 4,

lines 31-45; notifications are send to/from the adjacent switches by sending link state

packet, LSP, in order to find/discover the adjacent switch's link information; see col. 4, lines 31-35; see col. 6, lines 34-39).

Croslin teaches determining if new route information (see FIG. 6a, accumulate cost of the next node) improves at least one of the existing routes (see FIG. 6a, 612, cost threshold) or at least one of existing routes is made worse or lost (see FIG. 6a, Step 606, 610, 612 and 616; see col. 6, lines 55-65; see col. 10, lines 50-67); upon losing one of the existing routes (see FIG. 2, a link failure between A 202 and B 204; see col. 5, lines 25-36); initializing a best cost (see FIG. 6a, step 602, a method for calculating best cost rout begins; see col. 10, lines 40-45);

finding a neighbor node's link information by traversing a message (see FIG. 4, step 404 and 408; Find best route from a next node by sending a message; see col. 10, lines 1-6; 49-50;see col. 2, lines 9-30);

calculating a neighbor cost of reaching a node (see FIG. 6a, step 610, accumulate cost) via the neighbor node (see FIG. 2, next node (i.e. Node D); see col. 10, lines 51-54; accumulated cost to destination node (i.e. node C) via next node); and

setting the best cost (see FIG. 6a, 612,616 and see FIG. 6b, 618, 626, 628; new best cost and optimal cost route) to the neighbor cost (see FIG. 6a, accumulated cost) if the neighbor cost is less than the best cost (see FIG. 6a, 616; accumulated cost is less than current best cost; see col. 10, lines 50-67; see col. 11, lines 9-15)). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to calculating and selecting/setting the best

and optimal route, as taught by Croslin in the system of Soloway, so that it would

provide a mechanism for dynamically generation routes within a diverse

interconnected network and making the route costing an integral part of the process;

see Croslin col. 2, line 50-65.

Regarding claim 2, Soloway discloses receiving a link state packet (see FIG.

5, LSP packet) with information about the node's path to a root node (see FIG. 5,

Originator ID, Sender, Adjacency information, in the LSP packet; see col. 10, line 57

to col. 11, line 50; note that a root node is the originator of LSP packet.) and wherein

the node's route to the root node is improved (see col. 3, line 13-24 and col. 4, line

19-65; note that the LSP packet with the newly affected link/route information is

received due to the network topology changes (i.e. adding a new node/switch in the

network). The routing/forwarding Logic recalculates/updates the routes in the

forwarding table in accordance with the newly affected links/routes to

improve/advance the current/existing links routing.

Croslin teaches wherein the node's route to the root node is improved and

further comprising evaluating the node's neighbor nodes (see FIG. 4, step

402,404,408,410; see col. 9, lines 59 to col. 10, lines 13). Therefore, it would have

been obvious to one having ordinary skill in the art at the time the invention was

made to calculating and selecting/setting the best and optimal route, as taught by

Croslin in the system of Soloway, so that it would provide a mechanism for

dynamically generation routes within a diverse interconnected network and making

the route costing an integral part of the process; see Croslin col. 2, line 50-65.

Regarding Claim 3, Soloway discloses receiving a link state packet (see

FIG. 5, LSP packet) with information about the node's path to a root node (see FIG.

5, Originator ID, Sender, Adjacency information, in the LSP packet; see col. 10, line

57 to col. 11, line 50; note that a root node is the originator of LSP packet.) and

wherein the node's route to the root node has worsened (see col. 3, line 13-24 and

col. 4, line 19-65; note that the LSP packet with the newly affected link/route

information is received due to the network topology changes (i.e. a link is failed, or a

set of un-operational channels on the link) and further comprising evaluating the

node's path to the root node (see FIG. 2, List of forwarding channels, hold down bit

channel 8a; see col. 8, line 12-60; note that the switch determines/evaluates the

forwarding table by changing each potential destination node entry (i.e. hold down

bit on that particular channel of the affected links/routes). Also, note that the

destination node entries in the forwarding table include the neighbors'

switches/nodes.)

Regarding claims 4 and 27, Soloway discloses wherein nodes contained

within a subtree containing the node (see FIG. 2, the intermediate switches 4

between end nodes 10; note that the forwarding table in each node/switch contains

the intermediate/subtree switches (i.e. neighbor switches)) are scrapped, and the

routes to all nodes in the subtree are reevaluated (see FIG. 2, List of forwarding

channels, hold down bit channel 8a; see col. 8, line 12-60; note that the switch

determines/re-evaluates the forwarding table by changing each destination node

entry (i.e. hold down bit on that particular channel of the affected links/routes) after

receiving a link change LSP due to a failure.) Moreover, in case of a link failure, the

routes/links to the source/root node, stored in the forwarding table, are no longer

operational; the routing/forwarding logic must re-evaluate and re-compute the

existing routes in accordance with the affected links/routes. In the process of

recovering/improving the routing, first the logic must cancel the links/routes

associated with the affected switches. Then after, the routing logic must re-evaluate

and re-compute all routes/links associated with the immediate switches/nodes in the

forwarding table.

Regarding Claim 8, Soloway discloses wherein the computer network

comprises greater than one hundred nodes (see FIG. 1, switches 4, and see col. 23,

line 50-52; note that the network includes plurality of switches; thus, it is clear that

the plurality of switches can be greater than one hundred nodes).

Regarding Claim 9, Soloway discloses wherein said node has lost its path to

another node within the computer network (see col. 4, line 25-30 and 60-65; note

that the channel failure or a permanent link failure constitutes the losing the link to

another switch.)

Regarding Claim 10, Soloway discloses reattaching the node at a location

within a remaining portion of a spanning tree (see FIG. 2, a routing table of switch 4a

consists the Hold-down bit for channel 8a of switch 4d; FIG. 9 step 74-78; col. 3, line

15-41; col. 8, line 12-61; col. 6, line 34-69; note that when LSP/ILSP indicates the

affected link, the switch 4a enters the switch (i.e. switch 4d) associated with the

affected links (i.e. hold-down bit entry) in the forwarding table/tree. Then, the switch

(i.e. Switch 4a) re-computes/re-calculates/reattaches the switches associated with

the remaining non-affected links/switches in the forwarding table. Note that a

spanning tree is the forwarding table, which is build according to Dijkstra's

algorithm.)

Regarding Claim 11, Soloway discloses recalculating routes to all other

nodes in a subtree of which the node is a root node (see FIG. 2; col. 6, line 34-69;

note that when LSP/ILSP indicates the affected link, the switch (i.e. Switch 4a) re-

computes/re-calculates the links/routes associated with the switches/end-nodes the

in the forwarding table. One of the switches (i.e. Switch 4d) is the origination node.)

Regarding Claim 12, Soloway discloses performing an incremental route

recalculation for all nodes within the network that have received new link state

information (see col. 3, line 13-24 and col. 4, line 19-65; note that routing/forwarding

Logic recalculates/updates the routes in the forwarding table upon receiving LSP

packet. Also, see col. 7, line 60 to col. 8, line 33; and col. 20, line 31-61; note that

routing and forwarding logics in each switch utilizes Dijkstra's algorithm shortest path

calculation to compute/construct each route/link for the forwarding table. When

applying Dijkstra's algorithm for shortest paths, the algorithm must utilize the

differences/increments/deltas between existing routes and newly affected routes.

Thus, each switches utilizes incremental route calculation.)

Regarding Claim 16, Soloway discloses wherein the computer readable

medium is selected from the group consisting of CD-ROM, floppy disk, flash

memory, system memory, hard drive, and data signal embodied in a carrier wave

(see FIG. 4, the combined system of LSP Database 34 and Forwarding Table 36;
see col. 9, line 56 to col. 10, line 14; note that the combined system is the "system
memory" since it is capable of storing route information.)

Regarding Claim 25, Soloway discloses a root node, and Croslin discloses
teaches sorting nodes into the order of nodes (see Croslin FIG. 6) and the root node
(see FIG. 1, Node A) as described above in claim 22. Thus, the combined system
sorts nodes in to order of cost from the root node. In view of this, having the system
of Soloway and then given the teaching of Croslin, it would have been obvious to
one having ordinary skill in the art at the time the invention was made to modify the
system of Soloway, as taught by Croslin, for the same reason as stated above in
claim 22.

Regarding Claim 30, Soloway discloses applying an incremental Dijkstra's
algorithm to the root node (see col. 7, line 60 to col. 8, line 33; and see col. 20, line
31-61; note that routing and forwarding logics in each switch utilizes Dijkstra's
algorithm shortest path calculation to compute/construct each route/link for the
forwarding table. When applying Dijkstra's algorithm for shortest paths, the algorithm
must utilize the differences/increments/deltas between existing routes and newly
affected routes.)

Regarding Claim 32, Soloway discloses wherein said at least one the
existing routes is made worse (see col. 3, line 13-24 and col. 4, line 19-65; note that
the LSP packet with the newly affected link/route information is received due to the
network topology changes (i.e. a link is failed, or a set of un-operational channels on

the link) and further comprising recalculating routes to all nodes in a subtree of the

node (see FIG. 2, List of forwarding channels, hold down bit channel 8a; see col. 8,

line 12-60; note that the switch determines/re-evaluates the forwarding table by

changing each destination node entry (i.e. hold down bit on that particular channel of

the affected links/routes) after receiving a link change LSP due to a failure.)

Moreover, in case of a link failure, the routes/links to the source/root node, stored in

the forwarding table, are no longer operational; the routing/forwarding logic must re-

evaluate and re-compute the existing routes in accordance with the affected

links/routes. In the process of recovering/improving the routing, first the logic must

cancel the links/routes associated with the affected switches. Then after, the routing

logic must re-evaluate and re-compute all routes/links associated with the immediate

switches/nodes in the forwarding table.)

Regarding Claim 33, the combined system of Soloway and Croslin discloses

wherein recalculating routes to all nodes which have received new link state

information and processing said nodes in the order of distance from a root node (see

Soloway col. 7, line 60 to col. 8, line 33; and see col. 20, line 31-61; note that routing

and forwarding logics in each switch utilizes Dijkstra's algorithm shortest path

calculation to compute/construct each route/link for the forwarding table. When

applying Dijkstra's algorithm for shortest paths, the algorithm must utilize the

differences/increments/deltas between existing routes and newly affected routes.)

Croslin discloses processing in increasing order of distance from a root node (see

col. 3, lines 1-6, 45-67 to col. 4, lines 25; the process begins from the short route

first, then process to longer route). In view of this, having the system of Soloway and

then given the teaching of Croslin, it would have been obvious to one having

ordinary skill in the art at the time the invention was made to modify the system of

Soloway, as taught by Croslin, for the same reason as stated above in claim 1.

Regarding Claim 35, the combined system of Soloway and Croslin discloses

determining if said new route information improves or worsen at least one of the

existing routes or at least one of the existing route is lost as described above in

claim 1. Soloway discloses applying an incremental Dijkstra's algorithm to the root

node (see col. 7, line 60 to col. 8, line 33; and see col. 20, line 31-61; note that

routing and forwarding logics in each switch utilizes Dijkstra's algorithm shortest path

calculation to compute/construct each route/link for the forwarding table. When

applying Dijkstra's algorithm for shortest paths, the algorithm must utilize the

differences/increments/deltas between existing routes and newly affected routes.

Regarding Claim 37, Soloway discloses wherein the number nodes

examined (see FIG. 2, number of switches (and their corresponding path) which

associated/involved with re-routing or updating the table) is proportional to the log of

the number of nodes within the network (see FIG. 2, proportional to the number of

switches in the forwarding table/log/list of switches in the network; see col. 8, lines

10-60). Croslin also discloses wherein number nodes examined (see FIG. 6a, Step

606, 610, 612 and 616; see col. 6, lines 55-65; see col. 10, lines 50-67; number of

node (and their corresponding route) which associated/involved with re-routing for

best cost) is proportional to the log of the number of nodes within the network (see

FIG. 2 and see FIG. 3; note that the nodes involve in determining/evaluating for re-

routing are proportional to the list/log of number of nodes in the network; col. 10,

lines 51-54; see col. 5, lines 25-36;

8.   Claims 5-7, 17, 21, 23, 26,28 and 36 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Soloway in view of Croslin, as described in above claims, and

further in view of Callon (U.S. 5,430,727).

Regarding claim 5, Soloway discloses all aspects of the claimed invention

set forth in the rejection of Claims 1, and further discloses wherein recalculating

existing routes comprises implementing equal-cost path (see col. 7, line 60 to col. 8,

line 33; and see col. 20, line 31-61; note that routing and forwarding logics in each

switch utilizes Dijkstra's algorithm shortest path calculation when computing/re-

computing or constructing/re-construing routes/links for the forwarding table. It is

also note that when two shortest paths have the same cost, the rout/link is selected

based upon the order of the channel address (i.e. tie-breaker).) The tiebreaker rule

is implemented for two equal-cost paths in Soloway teachings. Croslin teaches

determining cost of each route as described above in claims 1 and 22. Neither

Soloway nor Croslin explicitly disclose equal-cost path splitting or splitting traffic

across more than one path if total cost is the same for each of the paths. However,

the above-mentioned claimed limitations are taught by well-established teaching in

the art of routing and Dijkstra algorithm, which teaches equal-cost path splitting or

splitting traffic across more than one path if total cost is the same for each of the
paths.

In particular, Callon teaches incremental Dijstra algorithm (see col. 51, lines
44 to col. 52, lines 16) and implementing equal-cost path splitting or splitting traffic
across more than one path if total cost is the same for each of the paths (see col. 46,
lines 50 to col. 47, lines 60; see col. 51, lines 44 to col. 45, lines 22; Dijkstra
calculation and forwarding and feature of 10589). Therefore, it would have been
obvious to one having ordinary skill in the art at the time the invention was made to
assign/implement Dijkstra algorithm's equal-cost path splitting, as taught by Callon in
the combined system of Soloway and Croslin, so that it would balance the load in
the network; see Callon col. 46, line 55-57; note that by splitting the load over equal
cost paths, it would decrease overloading one particular route/link by implementing
and assigning equal cost to path/routes and by distributing/splitting the traffic load
among equal cost links.

Regarding claim 6, Soloway discloses wherein the new route information
improves existing routes and the new route information is used in recalculating
routes (see col. 3, line 13-24 and col. 4, line 19-65; note that the LSP packet with the
newly affected link/route information is received due to the network topology
changes (i.e. adding a new node/switch in the network). The routing/forwarding
Logic recalculates/updates the routes in the forwarding table in accordance with the
newly affected links/routes to improve/advance the current/existing links routing.)
Croslin teaches only a parent node (see FIG. 2, node A) sending the new route

information (see FIG. 4, step 408) is used in recalculating of improved routes (see

FIG. 4, 410 and 416; best current optimal route; see col. 10, lines 1-14). Therefore, it

would have been obvious to one having ordinary skill in the art at the time the

invention was made to calculating and selecting/setting the best and optimal route

when recalculating/calculating, as taught by Croslin in the system of Soloway, so

that it would provide a mechanism for dynamically generation routes within a diverse

interconnected network and making the route costing an integral part of the process;

see Croslin col. 2, line 50-65.

Regarding claims 7 and 26, Soloway discloses all aspects of the claimed

invention set forth in the rejection of Claims 1, and further discloses wherein the new

route information worsens existing routes and a parent node sending the information

is no longer considered a parent node by said node (see FIG. 2, List of forwarding

channels, hold down bit channel 8a; see col. 8, line 12-60; note that the switch

determines/re-evaluates the forwarding table by changing and excluding each

destination node entry associated with the affected links/routes (i.e. hold down bit on

that particular channel of the affected links/routes) after receiving a link change LSP

due to a failure. Also, the patent node, a sender node, (i.e. FIG. 1, Switch 4c)

sending the LSP packet due to a failure is excluded from the destination node entry

in the forwarding table by hold down bits.

Regarding Claim 17, claim which that substantially discloses all the

limitations of the respective claim 5. Therefore, it is subjected to the same rejection.

Regarding Claim 21, claim which that substantially discloses all the

limitations of the respective claim 5. Therefore, it is subjected to the same rejection.

Regarding Claim 23, claim which that substantially discloses all the

limitations of the respective claim 5. Therefore, it is subjected to the same rejection.

Regarding Claim 24, Soloway discloses performing an incremental route

recalculation (see col. 3, line 13-24 and col. 4, line 19-65; note that

routing/forwarding Logic recalculates/updates the routes in the forwarding table upon

receiving LSP packet. Also, see col. 7, line 60 to col. 8, line 33; and col. 20, line 31-

61; note that routing and forwarding logics in each switch utilizes Dijkstra's algorithm

shortest path calculation to compute/construct each route/link for the forwarding

table. When applying Dijkstra's algorithm for shortest paths, the algorithm must

utilize the differences/increments/deltas between existing routes and newly affected

routes. Thus, each switches utilizes incremental route calculation.)

Regarding Claim 28, claim which that substantially discloses all the

limitations of the respective claim 5. Therefore, it is subjected to the same rejection.

Regarding Claim 36, claim which that substantially discloses all the

limitations of the respective claim 5. Therefore, it is subjected to the same rejection.

9.   Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Soloway

in view of Croslin, as applied to claim 1 above, and further in view of Spiegel (U.S.

5,649,108).

Regarding claim 29, the combined system of Soloway and Croslin discloses

all aspects of the claimed invention set forth in the rejection of Claim 1 as described

above. Soloway further teaches each node within the computer network is

represented by a data structure (see FIG. 4, a combined system of LSP database 34

and forwarding table 36; see col. see col. 9, lines 56 to col. 10, lines 12) comprising

information about links to other nodes (see FIG. 2, list of forwarding channels for the

destination switch 4b-d and end nodes; see col. 8, lines 8, lines 45 to col. 9, lines 49)

and cost of the link (see col. 14, lines 56 to col. 15, lines 24);

Neither Soloway nor Croslin explicitly discloses cumulative cost of all links

traversed from root to the node. However, Spiegel'108 teaches wherein each node

(see FIG. 6A, Node A) is represented by a data structure (see FIG. 6A, Routing

Table) comprising the information about the links to other nodes (see FIG. 6A,

Source route column) and cumulative cost of all links traversed from root (see FIG.

6A, destination address column) to the node (see FIG. 6A, total accumulative cost

for each destination; see col. 10, line 11-50). In view of this, having the combined

system of Soloway and Croslin, then given the teaching of Spiegel'108, it would

have been obvious to one having ordinary skill in the art at the time the invention

was made to modify the combined system of Soloway and Croslin, by providing the

cumulative cost in the routing table, as taught by Spiegel'108. The motivation to

combine is to obtain the advantages/benefits taught by Spiegel'108 since

Spiegel'108 states at col. 2, line 24-35 that such modification would provide the best

alternative paths by utilizing routing control which combine the benefits of

progressive protocol and originating routing protocol.

Response to Arguments

10.   Applicant's arguments filed 3/25/2005 have been fully considered but they are

not persuasive.

    Regarding claims 1,15,20 and 22, the applicant argued that, "Soloway do

not disclose recalculating routes and modifying a routing table for a node only when

new route information improves at least one of the existing routes or at least one of

the existing routes is made worse or lost..." in page 10, paragraph 2; page 11,

paragraph 2; page 13, paragraph 3-4; and "...Elliot does not show or suggest:

initializing a best cost upon losing an existing route; determining if new route

improves at least one of the existing routes or at least one of the existing routes is

mode worse or lost; finding a neigbhor's node link information by traversing an LSP;

or setting a best cost to the neighbor cost if the neighbor cost is less than the best

cost..." in page 11, paragraph 4 and page 12, paragraph 1.

    In response to applicant's arguments against the references individually,

one cannot show nonobviousness by attacking references individually where the

rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413,

208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375

(Fed. Cir. 1986).

In response to applicant's argument, the examiner respectfully

disagrees that Soloway and Elliot do not teach the argued limitations.

Soloway teaches evaluate existing routes of the node when new route

information is received (see FIG. 2; col. 3, line 13-24; col. 4, line 1-59; note that

when there is a change in the network, the LSP packet is received at the switch with

newly affected link/route information. The routing logic, according to the LSP routing

protocol, permits each switch to determine/evaluate the current/existing routes in the

forwarding table), and

recalculate routes and modify a routing table (see FIG. 4, Forwarding table

36) for said node only when said new route information improves existing routes or

existing routes are made worse or lost (see col. 3, line 13-24 and col. 4, line 19-65;

note that the LSP packet with the newly affected link/route information is received

due to the network topology changes (i.e. a link is failed, a set of operational

channels on the link changes, or a new switch is deployed). The routing/forwarding

Logic recalculates and modifies/updates the routes in the forwarding table in

accordance with the newly affected links/routes to recover/improve/advance the

current/existing links routing);

upon losing one of the existing routes initializing the process (see col. 4, lines

19-35; when the link is failed, the routing logic is initialized/began).

finding a neighbor node's link information by traversing an LSP (see col. 4,

lines 31-45; notifications are send to/from the adjacent switches by sending link state

packet, LSP, in order to find/discover the adjacent switch's link information; see col. 4, lines 31-35; see col. 6, lines 34-39).

Elliot teaches Elliott teaches determining if new route information improves at least one of the existing routes or at least one of existing routes is made worse or lost (see FIG. 4, steps S5-S7; the step S6 and S7 determines whether the routing message which includes the new link from the potential neighbor optimizes/aligns and improves the existing path/link from the actual neighbor (step S8) or not (Step S10). Note that "not optimizing/aligning/improving" means, the existing link from the actual neighbor is made worse; see col. 9, lines 44 to col. 10, lines 2); upon losing one of the existing routes (see col. 4, lines 25-35); initializing a best cost (see FIG. 3, S5; FIG. 4, S5, S6; when link state update is receive, the optimal low-cost rout evaluation begins; see col. 9, lines 20-25; 44-50; see col. 10, lines 9-25; note that the best for node A to reach Node B is via node C and D);

finding a neighbor node's link information by traversing an LSP (see FIG. 3, S5, and see FIG. 4, S6; receiving/sending cluster beacons (i.e. link state information message) to evaluate potential neighbor node's link state information; see col. 9, lines 44-60)

calculating a neighbor cost of reaching a node (see FIG. 2A, Node B) via the neighbor node (see FIG. 2A, Node C and D; see col. 9, lines 54-63; note that node A evaluates a cost of reaching node B via Node C and D); and

setting the best cost (see col. 9, lines 60-64; selecting/setting optimal low-cost) to the neighbor cost (see col. 9, lines 59-63; a low cost of reaching B) if the

neighbor cost is less than the best cost (see col. 9, lines 55 to col. 10, lines 8; 16-25;

Node A selects/sets node B's cost as an optimal low cost (i.e. new best cost) since

node A evaluates that the cost of node B is less expensive than a cost of reaching

node B via C and D (i.e. old best cost)).

Regarding the argument on claim 19 that Elliot does not disclose,

"determining if new route information improves at least one of the existing routes or

at least one of the existing exists is made worse or lost", Elliot discloses the

evaluation process is performed for route optimization which impact on the

current/existing routes and topologies (see Elliot col. 9, lines 40-67), which clearly

reads on the applicant claim limitation "**at least one of existing routes**".

Thus, the combined system of Soloway and Elliot clearly teaches the

applicant argued limitations.

The applicant argued that, "...there is no suggestion to combine the

teaching of Soloway with Elliot..." in page 12, paragraph 2.

In response to applicant's argument that there is no suggestion to combine

the references, the examiner recognizes that obviousness can only be established

by combining or modifying the teachings of the prior art to produce the claimed

invention where there is some teaching, suggestion, or motivation to do so found

either in the references themselves or in the knowledge generally available to one of

ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir.

1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this

case, the motivation, as previously disclosed in last office action page 6, is clearly

disclosed by Elliot at col. 1, line 40-64, see col. 3, lines 40-64 would provide

optimally or optimal selection/setting of improved/better low-cost neighbor nodes

based upon cost-of transaction.

The applicant argued that, "...Croslin does not include determining if one of

the existing routes is made worse or lost..." in page 14, paragraph 1.

In response to applicant's arguments against the references individually,

one cannot show nonobviousness by attacking references individually where the

rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413,

208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375

(Fed. Cir. 1986).

In response to applicant's argument, the examiner respectfully

disagrees that Elliot do not teach the argued limitations. Soloway teaches the

argued limitation as set forth in above response.

Croslin teaches determining if new route information (see FIG. 6a,

accumulate cost of the next node) improves at least one of the existing routes (see

FIG. 6a, 612, cost threshold) or at least one of existing routes is made worse or lost

(see FIG. 6a, Step 606, 610, 612 and 616; see col. 6, lines 55-65; see col. 10, lines

50-67); upon losing one of the existing routes (see FIG. 2, a link failure between A

202 and B 204; see col. 5, lines 25-36); initializing a best cost (see FIG. 6a, step

602, a method for calculating best cost rout begins; see col. 10, lines 40-45).

Thus, the combined system of Soloway and Croslin clearly teaches the

applicant argued limitations.

The applicant argued that, "...there is no suggestion to combine the teaching of Soloway with Croslin..." in page 14, paragraph 2.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation, as previously disclosed in last office action page 23, is clearly disclosed by Croslin at col. 2, line 50-65 would provide a flexible high-speed route generation process which dynamically generation routes within a diverse interconnected network and making the route costing an integral part of the process; see Croslin col. 2, line 50-65.

Regarding claim 22 the applicant argued that, "...none of the references cited show or suggest reattaching routes at lowest cost point in a spanning tree and re-evaluating routes from reattached nodes...Soloway do not reattach routes..." in page 14, paragraph 5 and page 15, paragraph 2.

In response to applicant's argument, the examiner respectfully disagrees that none of cited reference show or suggest the argued limitations.

Soloway teaches reattaching routes in a spanning tree (see FIG. 2, a routing table of switch 4a consists the Hold-down bit for channel 8a of switch 4d; FIG. 9 step

74-78; col. 3, line 15-41; col. 8, line 12-61; col. 6, line 34-69; note that when

LSP/ILSP indicates the affected link, the switch 4a enters the switch (i.e. switch 4d)

associated with the affected links (i.e. hold-down bit entry) in the forwarding

table/tree. Then, the switch (i.e. Switch 4a) re-computes/re-calculates/reattaches the

switches associated with the remaining non-affected links/switches in the forwarding

table. Note that a spanning tree is the forwarding table, which is build according to

Dijkstra's algorithm.) and re-evaluating routes from reattached nodes (see FIG. 2,

List of forwarding channels, hold down bit channel 8a; see col. 8, line 12-60; note

that the switch determines/re-evaluates the forwarding table by changing each

destination node entry (i.e. hold down bit on that particular channel of the affected

links/routes) after receiving a link change LSP due to a failure.) Moreover, in case of

a link failure, the routes/links to the source/root node, stored in the forwarding table,

are no longer operational; the routing/forwarding logic must re-evaluate and re-

compute the existing routes in accordance with the affected links/routes. In the

process of recovering/improving the routing, first the logic must cancel the

links/routes associated with the affected switches. Then after, the routing logic must

re-evaluate and re-compute all routes/links associated with the immediate

switches/nodes in the forwarding table).

Elliot teaches evaluating routes if existing routes are improved, lost or made

worse (see FIG. 4, steps S5-S7; the step S6 and S7 determines whether the routing

message which includes the new link from the potential neighbor optimizes/aligns

and improves the existing path/link from the actual neighbor (step S8) or not (Step

S10). Note that "not optimizing/aligning/improving" means, the existing link from the actual neighbor is made worse; see col. 9, lines 44 to col. 10, lines 2;

reattaching routes at lowest cost point (see col. 9, lines 44-67; the link/path from the node with the less expensive or lowest-cost is selected and incorporated into network topology in the routing table).

Thus, the combined system of Soloway and Elliot clearly teaches the applicant argued limitations.

In view of the above, **the examiner respectfully disagrees** with applicant's argument and believes that the combination of references as set forth in the 103 rejections are proper.

Conclusion

11.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.
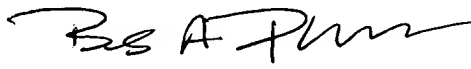
12.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Ian N. Moore whose telephone number is 571-272-

3085. The examiner can normally be reached on M-F: 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Chau T. Nguyen can be reached on 571-272-3126. The fax phone number

for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

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you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

INM
6/8/05

BOB PHUNKULH
PRIMARY EXAMINER